Title: Discovering the World of Graphs

Brief Overview:

These activities were developed to encourage creativity and discovery of concepts. In cooperative groups students will engage in a variety of hands-on activities to organize and interpret data displayed in a graph format. Math journals will be incorporated daily. Each day's lesson should be assessed through kid-watching, anecdotal records, and the child's overall performance.

Link to Standards:

- **Problem Solving** Students will demonstrate their ability to solve mathematical problems by interpreting and differentiated different types of graphs and their most effective uses.
- **Reasoning** Students will determine the most effective way to display collected data. They will make conjectures and give evidence to support their choices.
- **Number Relationships** Students will demonstrate their mastery of basic number concepts while they interpret their collected data.
- **Statistics** Students will be actively involved in the collection, organization, and display of data into various types of tables and graphs.

Grade/Level:

Grades 4-5

Duration/Length:

To accomplish the objectives of the unit will take approximately five days.

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- 3-digit addition and subtraction
- Multiples
- Sorting and classifying
- Tally marks
- Plotting coordinates
- Basic geometrical shapes

Objectives:

Students will:

- work cooperatively in groups.
- collect, analyze, and organize data.
- display data using a table, bar graph, line graph, and pictograph.
- determine appropriate scales for their graphs.

Materials:

- An individual bag of M&M's for the class
- Pencils/ crayons/ markers
- 1" graph paper (several sheets)
- Collection of geometrical shapes
- Copies of one week's lunch count
- The attendance for each student for one month
- Math journals
- Unifix cubes

Development/Procedures:

Day 1: Students will organize information using both a table and a pictograph.

- Discuss with students different ways data can be collected and displayed.
- Divide the class into cooperative groups of four.
- Give each group a bag of M&Ms.
- Direct students to sort and count the different colors of M&Ms. Allow students to organize this information and record in whatever way their group chooses.
- Have students share with the class how they chose to display their information. If students do not display a title, use questioning techniques to help them discover the importance of correct labeling.
- Have students put their recorded information in a table using tally marks.
- Have students then predict what a pictograph is. Share examples. Have students apply this information and as groups create a pictograph for their table.
- Have groups share their pictographs with the class. Have students eat M&Ms and enjoy!!!!!
- Have students respond to the following in their math journals: Explain what a pictograph is. List situations when a pictograph would be useful or effective. Share responses.

Day 2: Students will apply skills learned previously to visually display both a pictograph and table. Students will begin to discover the elements necessary to create a bar graph.

- Pair students and give each pair one penny and two sheets of graph paper.
- Direct students to flip the penny 20 times and record their results as heads or tails on a table.
- Discuss gathered information. Then create a class table using data from each pair.
- Paired students should then use the class data to create a pictograph.
- Ask students to display this information another way on their graph paper.
- Have each pair explain what they did and why they chose this method.
- Using questioning techniques, as a summary, have students deduce that a scale is necessary for an effective display of data.
- Ask students to explain in their math journals why a scale would be necessary to display information effectively. Furthermore, why might it be necessary to use different scales for data collected in your paired than from class data? Share responses.

Day 3: Students will make a bar graph incorporating all of the necessary elements.

- Put students in cooperative groups of four. Pass out bags of various geometric shapes. (At least 30 pieces and four different shapes for each group) 1"graph paper and crayons.
- Review the use of scales from the previous lesson.
- Direct each group to classify and count the different shapes in their bag. Have students record their data using a bar graph. The graph should include all necessary elements.
- Create a class table using the shape data from each group.
- Discuss ways to display the class information on a bar graph encouraging students to discover that with larger numbers, scales should be modified.
- Make a class display of the shape table data. Students should decide on a title, category labels and appropriate scale.
- In their math journals, have students give situations in which they might use a table, pictograph and bar graph. Share responses.

Day 4: Students will create a line graph using all necessary elements.

- For this activity make up a record of each day's lunch count for a week (who packed, bought, etc.). This data will be used to create a line graph.
- Display the lunch data in a table using tally marks.
- Pair students. Pass out unifix cubes.
- Have students use the lunch count data to create a bar graph using the cubes.
- Next, have students trace their bars onto a blank sheet of paper. Have students finish this by incorporating the other necessary elements.
- Discuss and review necessary elements in a bar graph.

- Have students apply previous knowledge to predict what a line graph is. Lead the class to discover the elements that would be necessary for an effective line graph.
- Have students transfer their bar graph data to a line graph.
- Share graphs and compare similarities and differences between line graphs and bar graphs.
- Have students write two or three questions in their math journals that the lunch count line graph will answer. Have students share their questions with the class and allow time for students to answer.

Performance Assessment:

Day 5: The final day will be an assessment of the week's activities.

- Develop a rubric appropriate for your class to measure the students' mastery of the unit objectives. Final assessment may be based on Activity 5, cooperative group activities, class performance, and the students ability to support their ideas.

- For today's activity make up a copy of the attendance for one month. Pair students and distribute crayons, large graph paper, and the attendance information.

- Explain to students that each pair should visually display the attendance data. Each pair will be responsible for an appropriately labeled graph and written explanation supporting their choice based on the week's activities.

Extension/Follow Up:

- Have students in groups create a board game. This game should require the players to interpret tables and graphs.

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